

Appl. No. : 10/621,196
Filed : July 15, 2003

REMARKS

The foregoing amendments are responsive to the July 10, 2008 Office Action. Applicant respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Response to Rejection of Claims 39, 42 and 45 Under 35 U.S.C. 103(a)

The Examiner rejected Claims 39, 42 and 45 under 35 U.S.C. 103(a) as being unpatentable over Blume et al. (US 6,014,580) in view of Nowlin et al. (US 6,459,926) and Borst (WO 95/01757).

Blume teaches a device for specifying the orientation of a magnetic field. Nowlin teaches a system that maintains a fixed relationship between an input handle end and a surgical end effector. Combining Blume with Nowlin does not yield a system with a tactile feedback and a controller that includes a correction input to allow the system controller to compensate for a dynamic position of a wall of a heart chamber such that a surgical tool moves substantially in unison with said wall.

Borst teaches a system that uses video cameras to track a target and maintain distance between surgical instruments and the target. Borst does not teach or render obvious a system wherein an amount of the tactile feedback is computed by the system controller at least in part according to the position error, wherein a correction input to the desired position is computed based on data from an auxiliary device that measures a position of a heart relative to a frame of reference, such that the system controller compensates for a dynamic position of a wall of a heart chamber such that the distal end moves substantially in unison with a natural motion of the wall. Rather than use a correction input to a control system computing tactile feedback, Borst teaches using a separate control system for adjusting robotic arms to movement of the target. As shown in Figure 6, Borst teaches that data from the image processor 8 is provided to the tracking control

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31 which in turn controls the robotic arms. The surgeon provides inputs to the separate robotic computer system 37 that in turn controls the independent controls 38 and 38'. In teaching separate control systems, Borst teaches away from the claimed providing a correction input to a system processor that computes tactile feedback. The system of Borst does not teach or render obvious a system where both tactile feedback and motion compensation is provided by a system controller that controls the claimed electromagnets to move a tool having a distal end responsive to magnetic fields. The system of Borst which provides separate control functions is thus inapplicable to the claimed system where only one control modality, the magnetic fields generated by the electromagnets, is available to provide force to move the tip.

In rejecting Applicant's arguments to the previous Office Action, the Examiner misstates Claim 39. The Examiner argues that Claim 39 "merely states a correction input to said desired position is computed. In actuality, Claim 39 states: ". . . tactile feedback is computed by said system controller at least in part according to said position error, wherein a correction input to said desired position is computed based on data from an auxiliary device . . . " The correction input is computed from data from the auxiliary device is used in the tactile feedback computation. Thus, it is not obvious how to combine Borst with Nawlin to compute tactile feedback using a correction input to the position error because Borst teaches decoupling the motion compensation system from the surgeon-controlled system.

Regarding Claim 39, the cited prior art does not render obvious a controllable magnetic field source having a first cluster of electromagnet poles and a second cluster of electromagnet poles, the first cluster of poles substantially opposed to the second cluster of poles, a tool having a distal end responsive to the magnetic field, one or more sensors configured to sense a current position of the distal end; a system controller for controlling the magnetic field source to control a movement of the distal end according to a feedback calculation wherein the system controller is configured to compute a position error comprising a difference between a desired position of the distal end and the current position of the distal end; and a Virtual Tip that provides tactile feedback to an operator, wherein an amount of tactile feedback is computed by the system

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controller at least in part according to the position error, wherein a correction input to the desired position is computed based on data from an auxiliary device, such that the system controller compensates for a dynamic position of a wall of a heart chamber such that the distal end moves substantially in unison with the wall.

Regarding Claim 42, the prior art does not render obvious the apparatus of Claim 39, where the apparatus further includes an operator interface unit.

Regarding Claim 45, the prior art does not render obvious the apparatus of Claim 39 with a Virtual Tip Calibration Fixture.

Applicant asserts that Claims 39, 42 and 45 are allowable over the prior art, and Applicant requests allowance of Claims 39, 42 and 45.

Response to Rejection of Claims 40 and 41 Under 35 U.S.C. 103(a)

The Examiner rejected Claims 40 and 41 under 35 U.S.C. 103(a) as being unpatentable over Blume et al. (US 6,014,580) as modified by Nowlin et al. (US 6,459,926), as applied to Claims 39, 42 and 45 above and Borst, and further in view of Solf et al. (US 6,587,709). Blume and Nowlin are discussed above.

Regarding Claim 40, the prior art does not render obvious the apparatus of Claim 39, where the distal end includes one or more piezoelectric rings.

Regarding Claim 41, the prior art does not render obvious the apparatus of Claim 39, where the distal end includes one or more piezoelectric rings for providing sensor data to a system controller. Neither Solf, nor the other cited references, teach or render obvious providing sensor data from one or more piezoelectric rings to a system controller.

Applicant asserts that Claims 40 and 41 are allowable over the prior art, and Applicant requests allowance of Claims 40 and 41.

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Response to Rejection of Claim 43 Under 35 U.S.C. 103(a)

The Examiner rejected Claim 43 under 35 U.S.C. 103(a) as being unpatentable over Blume et al. (US 6,014,580) as modified by Nowlin et al. (US 6,459,926), as applied to Claims 39, 42 and 45 above and Borst, and further in view of Hastings et al. (US 6,148,823). Hastings teaches a first pole connected to a second pole by a magnetic material. The cited references do not teach or render obvious a first cluster of electromagnet poles connected to a second cluster of electromagnet poles by a magnetic material.

Regarding Claim 43, the cited prior art does not make obvious the system of Claim 39 wherein the first cluster of poles is connected to the second cluster of poles by a magnetic material.

Applicant asserts that Claim 43 is allowable over the prior art, and Applicant requests allowance of Claim 43.

Response to Rejection of Claim 46 and 47 Under 35 U.S.C. 103(a)

The Examiner rejected Claims 46 and 47 under 35 U.S.C. 103(a) as being unpatentable over Blume et al. (US 6,014,580) as modified by Nowlin et al. (US 6,459,926) as applied to Claims 39, 42 and 45 above and Borst, and further in view of Haynor et al. (US 6,129,668) and Tanabe et al. (US 5,550,469).

Regarding Claim 46, the prior art does not render obvious the apparatus of Claim 39, further including a communication controller, a calibration fixture, and one or more temperature sensors.

Regarding Claim 47, the prior art does not render obvious the apparatus of Claim 39 wherein said one or more sensors comprise one or more temperature sensors paired with one or more magnetic sensors.

Applicant asserts that Claims 46 and 47 are allowable over the prior art, and Applicant requests allowance of Claims 46 and 47.

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Summary

Applicant respectfully asserts that Claims 39-43 and 45-47 are in condition for allowance, and Applicant request allowance of Claims 39-43 and 45-47. If there are any remaining issues that can be resolved by a telephone conference, the Examiner is invited to call the undersigned attorney at (949) 721-6305 or at the number listed below.

Respectfully submitted,

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